



UDC 332

ESTIMATING THE WILLINGNESS OF FARMERS TO PAY FOR CATTLE BUSINESS INSURANCE PREMIUMS: A CASE STUDY IN TAKALAR REGENCY, INDONESIA

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ABSTRACT

In order to support farmers, the Indonesian government offers a livestock insurance program called the cattle business insurance (AUTS), which is subsidized by 80 percent. Farmers are responsible for paying the remaining amount, which totals IDR 40,000 per head per year. The objective of this research is to assess the extent to which farmers are willing to contribute to cattle business insurance premiums and to examine the factors that influence their willingness to do so in the village of Timbuseng, located in the Takalar Regency of South Sulawesi, Indonesia. A survey was conducted, targeting 74 households selected through cluster sampling. To determine the willingness of farmers to pay for cattle insurance premiums, we employed the contingent valuation method, and logistic regression was used to analyze the factors that affect this willingness. The independent variables considered in the analysis included age, number of family members, level of education, income, farming experience, and the amount that farmers are willing to contribute as insurance premiums. The study found that the average amount farmers are willing to pay for AUTS insurance premiums is IDR 32,940, which is lower than the government-set rate of about 17.65%, with a participation rate of 37.33%. Factors such as a farmer's age, income and farming experience influence a farmer's willingness to pay cattle farm insurance premiums. Farmers' decisions to pay insurance premiums lower than government-mandated rates may be due to their financial constraints and inability to afford higher premiums. These varying factors highlight the complexity of farmers' decision-making and the need for customized insurance options that take into account their individual circumstances.

KEY WORDS

Cattle, income, insurance, logistic regression, participation, premium.

Policies and initiatives for ensuring food security in Indonesia must be continually improved, particularly in the area of livestock. In this regard, every year, population growth requires more and more food, which must be readily available. Higher demand than domestic production is one reason why Indonesia's food supply and the community's ability to purchase livestock goods, particularly beef and milk, remain problematic. Thus, livestock development needs to be continuously improved (Tenrisanna & Kasim, 2021). Indonesia could produce 436,700 metric tons of beef and buffalo in 2022. In the meantime, 695,399 metric tons of beef and buffalo were consumed annually. Indonesia still had a 258,691-tonne deficit as a result (BPS Statistics Indonesia, 2022). The Indonesian government continues to support farmers to improve their livestock farming businesses. Accordingly, Indonesia's beef distribution and production are improving, attributed to current livestock legislation (Basyar, 2021). This assistance includes giving farmers access to resources like better breeding techniques, veterinary services, and financial assistance. These ongoing assistances are crucial to bridging the deficit and ensuring a self-sufficient and sustainable beef and buffalo industry in Indonesia.



As part of its efforts to foster the growth of the beef cattle industry, the Indonesian government provides subsidies for insurance premiums on cattle and buffalo, which are part of their livestock policies. The name of the scheme is Cattle and Buffalo Commercial Insurance (AUTS/K Scheme). The Ministry of Agriculture of the Republic of Indonesia launched the Cattle Breeding Commercial Insurance (AUTS) Scheme in 2016. This is an agricultural insurance plan specifically for the cattle industry (Maulidi et al., 2021). Farmers are protected by cattle and buffalo insurance in the event that the livestock dies from illness, infection, disaster, or other causes (Gusti et al., 2023).

The agricultural sector faces a variety of production hazards connected to weather, natural disasters, pests and diseases, and market conditions. The welfare and economic security of farming households are both impacted by all of these threats. Risk management is crucial to the advancement of agriculture (Wang et al., 2011; Xiu et al., 2012). Agricultural insurance is one of the most efficacious and important risk management strategies to stabilize farmers' income. The development and operational phases of agricultural insurance are both complicated business lines that demand a high level of technical skill (Ghimire, 2014). These phases involve various processes such as risk assessment, underwriting, claims management, and policyholder servicing. Agriculture-related risks have significantly reduced farmer income and productivity (Bannor et al., 2023). Agricultural insurance significantly impacts cash crops and large farmers, enhancing the agricultural insurance system and promoting rural development (Xie et al., 2024). Agricultural insurance is of great significance to mitigating climate change risks and ensuring food security (Sun et al., 2024). Hence, agricultural insurance provides financial protection against unpredictable risks, sustaining farmers' livelihoods through risk assessment, underwriting, claims management, and policyholder servicing, fostering rural development and resilience.

The AUTS will mitigate the risk of livestock loss or fatality. The premium price is the cost of insurance coverage. Each individual is required to pay an annual insurance premium of IDR 200,000. The government generously covers 80% of this amount, which equals IDR 160,000 per person per year, while farmers are responsible for the remaining 20%, totaling IDR 40,000 per person per year. Moving on, the insurance coverage for livestock (specifically cattle and buffalo) in the agricultural sector amounts to IDR 10,000,000 per animal (Kementerian Pertanian Republik Indonesia, 2021). As per the Law on the Protection and Empowerment of Farmers, PT Jasa Asuransi Indonesia (Persero) has been designated by the government to serve as the program administrator, fulfilling the role of an insurance company (Imam et al., 2018). Based on the information in the SIAP (Agricultural Insurance System) application, *AUTS/K* participants reached 9,791 farmers for 140,190 heads in 28 provinces. In contrast, in 2016, *AUTS* was only accessed by 1,329 farmers with 30,227 insured cattle in 19 cattle-producing provinces (Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2020). This data indicates that the *AUTS* scheme benefits cattle breeders; the compensation given allows cattle breeders who suffer losses from death or animal loss to carry on with their business. Studies have shown that farmers' choices to engage or abstain from the *AUTS* program are influenced by multiple factors (Gusti et al., 2023; Ilmawati et al., 2021; Maulidi et al., 2021; Riana et al., 2019).

Under Law No. 19 of 2013 Concerning Farmers' Protection and The empowerment and Minister of Agriculture Regulation No. 40/Permentan/SR.230/7/2015 Concerning Agricultural Insurance Facilitation, agricultural insurance is essential in Indonesia. The study's findings demonstrate that farmers must bear the burden of paying a premium, especially if their cattle have not vanished or died in a year. Furthermore, farmers do not receive detailed information regarding cattle insurance and are not interested in government incentives for paying premiums (Arsih et al., 2021; Fadhil et al., 2021). Farmers' responses to the cattle insurance program differed, according to earlier research. There were still some farmers who could not get over their inability to understand the concept or who had no interest in taking part in the livestock insurance scheme. Since this study has not been conducted, particularly in the South Sulawesi Province, it provides context for our empirical investigation into the factors that influence farmers' decisions about cattle insurance in terms of their willingness to pay and the premiums they choose for their livestock enterprises.



The study took place in Timbuseng Village, North Polongbangkeng District. This district has the highest number of cattle in Takalar Regency. However, in 2021, only 49% of the population had insurance coverage (Dinas Pertanian Takalar, 2022). The study's findings give the government information on the premium values that farmers are able to pay, and the variables that impact how willing they are to pay for insurance for their cattle.

METHODS OF RESEARCH

This study was carried out in October 2022 in the village of Timbuseng, Takalar Regency of South Sulawesi, Indonesia. Primary and secondary data were the two categories of data used in this study. There were 277 populations in this study that were all beef cattle farmers. Following Singh and Masuku (2014), the determination of the samples was calculated using the formula with a static error of 10%, and 74 was set as the sample size. In the Village, there are seven hamlets, including Panaikang I, Panaikang II, Sauleya, Tanasambayang, Bontobaddo, and Timbuseng I and Timbuseng II. The sampling technique used in this study was cluster random sampling. Cluster random sampling is a method used to determine samples from small groups or units (Singh and Masuku, 2014).

The research aimed to understand households' socioeconomic characteristics, participation in cattle business insurance, access to insurance information, and understanding of insurance. Semi-structured interview questions were used. Selected enumerators received training on the techniques for gathering data and the topics covered in the interview schedule.

Literature and secondary sources were also used to supplement the main materials. Supporting data was gathered from relevant organizations, the local government, PT Jasindo (the Indonesian insurance service), journal papers, and summaries of policy documents. A focus group discussion (FGD) was utilized to gather qualitative data so that specific information could be obtained and used to appropriately interpret the survey results. Farmers, local government officials, and insurance officers were specifically selected as FGD participants. The conversation discussed factors, challenges, and obstacles influencing farmers' choice to participate in cattle business insurance programs, and provided additional information to enhance their understanding.

We used frequency, mean value, and standard deviation to analyze household socioeconomic characteristics and business scales, including schooling, age, length of farm experience, income, and number of family dependents, in the descriptive study. In addition, descriptive statistics were used to analyze data on farmer awareness and participation in the program, and farmer readiness to pay insurance premiums.

The contingent valuation technique (CVM) is used to analyze the worth of the willingness of farmers to pay a risk premium for their cattle (Mahboob et al., 2019; Xiu et al., 2012). The willingness of farmers to pay for particular goods and services, as well as their readiness to accept such goods and services, can be directly assessed using the contingent valuation method (CVM) (Mutaqin and Usami, 2019; Oduniyi et al., 2020). Additionally, CVM, along with contamination impact and environmental preservation, is also a basic survey-based non-market evaluation technique. To find out if farmers are willing to pay in cash for these goods or accept a waiver of their use of those goods, it employs survey questions (Xiu et al., 2012).

We employ two methods in the CVM technique. First, we construct a hypothetical market in the CVM. According to Mutaqin, DJ (2019), the creation of a hypothetical market was necessary due to the risks associated with the beef cattle industry, such as livestock losses brought on by disease outbreaks and natural disasters, which could have an impact on the return on investment for businesses, farmers' income, farmers' living expenses, and other factors. How much a farmer would be prepared to pay for insurance for his cattle company in the event that the government modified its future policy on insurance premiums was the question posed to a hypothetical market in this study. In the second approach, we obtain auction values (bids) using an elicitation method based on several rounds of yes-or-no



questions. The bidding game helps farmers determine the maximum value of their WTP (Ghazanfar et al., 2015).

The average value of WTP is calculated using the following equation (Hakim et al., 2021; Kurniaty et al., 2021):

$$EWTP = \sum Wi(Pfi)$$

Where: *EWTP* = respondents' average willingness to pay (IDR); *Wi* = the *i*-WTP value (IDR); *Pfi* = the *i*-th relative frequency; *i* = respondent *i* (*i* = 1, 2, ..., 100).

Logistic regression analysis was used to ascertain the willingness of farmers to pay livestock business insurance premiums. A dummy variable that expresses the respondent's desire to pay for insurance or not serves as the indicator for the dichotomous response variable (Archer & Lemeshow, 2006; Chand et al., 2016). By applying a simple mathematical framework that is less responsive to the distribution of sample characteristics, the logistic or logistic model makes use of the maximum likelihood estimation approach (Austin, 2017; Dong et al., 2020). The dependent variable is categorized into two groups. Farmers in the first group are those who, at a value of one, would like to pay a premium; farmers in the second group, with a value of zero, are not. The logistic model used (Dong et al., 2020), as follows:

$$P(y = 1|x) = \frac{G(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m)}{1 + G(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m)}$$

Where: β_0 is a constant, $\beta_1, \beta_2, \dots, \beta_m$ is the regression coefficient of X_m ($i=1,2, m$) which displays the observed shift in farmers' willingness to pay livestock business insurance premiums in log odds. A one-unit rise in the relevant explanatory variable improves the likelihood that the farmer will be able to pay the insurance premium, according to positive coefficient estimation. $G(f(x))$ provides the opportunity ratio related to changes in the independent variable. Table 1 lists the variables' definitions that were used in the logistic regression model.

Table 1 – Variable definitions in logistic regression models

| Variable | Description |
|--------------------|---|
| WTP Participation | 1 = participate, 0 = otherwise |
| Age | Year |
| Education | 1= No school; 2 = Primary school; 3 = Junior high school; 4 = Senior high school; 5 = Diploma |
| Income | IDR/month |
| Family member | Number |
| Farming experience | Year |
| Number of cattle | Head |
| WTP value | IDR (Indonesian Rupiah) |

Stata version 14 (StataCorp, 2015) was used for statistical analysis.

RESULTS AND DISCUSSION

Table 2 shows that, at the time of the interview, the respondents' average age was 46 years old. Out of the 74 respondents, 37 farmers were male and 38 were female. The average length of education for cattle farmers in the research location was 6-7 years. The average income level of farmers was IDR 1,884,009 per month, with an average family dependency of four people. The respondents' main source of income was as farmers, either paddy farmers or sugarcane farmers. Rice harvesting was done once a year. The average number of cattle owned was three. The percentage of people who own cattle is still quite low, and they are primarily used as a source of savings rather than as their main source of income. Valerio et al (2022) argued that smallholder farmers' use of livestock as capital stock means they only sell their livestock when they are in need of supplies. In this study, when viewed from the perspective of the length of cattle farming, the average cattle farmer had



been raising cattle for 15 years. Overall, these statistics provide a preliminary overview of the demographic and socioeconomic characteristics of the farmers included in the study.

In order to determine the farmers' readiness to pay a risk premium for their cattle, this study used the contingent valuation technique (CVM) by implementing an auction value. Thirty-two farmers were found to be interested in paying a premium of less than IDR 40,000 based on the procedure of using the contingent valuation approach. Table 3 shows that 36 farmers were ready to pay IDR 40,000, and 6 farmers were inclined to pay more. Farmers' willingness to pay on average (EWTP) for a cattle business insurance premium was IDR 32,940, a lower premium than the current premium of IDR 40,000. Kurniaty et al (2021) study showed that if the government stops funding the insurance program, the average farmers' WTP for premiums would be IDR 45,660, or 22.83% of the total IDR 200,000 premium. These two studies suggest that government subsidies play a crucial role in making insurance affordable for farmers.

Table 2 – Statistics of Farmer Characteristics

| Variable | Mean | Std. Dev | Min | Max |
|-------------------------------|-----------|----------|-----------|-----------|
| Age (year) | 46.324 | 12.891 | 22 | 75 |
| Gender (1=men, 0=women) | .5 | .503 | 0 | 1 |
| Years of education | 6.932 | 3.811 | 0 | 15 |
| Income (IDR/month) | 1,884,009 | 1148738 | 583,333,3 | 5,833.333 |
| Family member (person) | 3.918 | 1.382 | 1 | 10 |
| Farming experience (year) | 15.175 | 11.115 | 1 | 50 |
| Number of cattle owned (head) | 3.229 | 1.969 | 1 | 10 |

Table 3 – The average level of farmer willingness to pay insurance premiums

| WTP value(IDR) | Frequency(farmers) | Relative Frequency | EWTP (IDR) |
|----------------|--------------------|--------------------|------------|
| <40,000 | 32 | 0.432 | 8,640 |
| 40,000 | 36 | 0.486 | 19,440 |
| >40,000 | 6 | 0.081 | 4,860 |
| Total | 74 | | 32,940 |

For cattle coverage, the average amount that farmers were willing to pay (EWTP) was IDR 32,940. This cost is 17.55% less than the premium price of IDR 40,00 per head per year that the government had established. Farmers' reduced readiness to pay for livestock insurance suggests that they may think the premiums are excessive or the coverage is insufficient. This discrepancy between the government-set premium and the average willingness to pay could potentially hinder the uptake of livestock insurance among farmers, leading to lower adoption rates and reduced risk management in the beef cattle industry. Further research is needed to explore the reasons behind this gap and develop strategies to bridge it effectively.

The factors driving the willingness of farmers to pay the premiums for cattle business insurance have been examined using a logistic regression model. Table 4 presents the analysis's findings.

The Wald test (LR chi2) for the model in Table 4 indicates that, at the 1% level, the model offers a good explanation. This indicates that the likelihood that farmers will be willing to pay cattle insurance premiums is influenced by each independent variable in the model in concert with the others. The value of the prob. > chi2 is 0.0101. We may reject the null hypothesis, which states that none of the independent variables significantly affects the independent variable, because this result is less than the test significance level of 0.05. It is therefore possible to conclude that at least a single independent factor significantly influences the independent variable at a 95 percent confidence level.

The results of the logistic regression analysis indicated that the farmers' willingness to pay a cattle business insurance premium in the village of Timbuseng was significantly influenced by age, household income, and farming experience. Farmers' willingness to pay insurance premiums was significantly influenced by the age variable, which also showed a negative connection. This demonstrates how the respondent's age influences their decision



to participate in the cattle business insurance. Older farmers adopted new programs with greater reluctance than their younger counterparts. The same results were obtained in Kurniaty et al (2021) and Bishu et al., (2018), whereas On the other hand, the age variable was significant and had a negative correlation with the willingness of farmers to pay for livestock insurance. The inverse correlation shown between age and insurance premium willingness raises the possibility that elderly farmers are less receptive to novel approaches to risk management in the cattle industry and are more risk adverse. It is possible that older farmers have accumulated more experience and knowledge over the years, leading them to rely on traditional methods rather than relying on insurance.

Table 4 – The logistic estimation of factors driving the willingness of farmers to pay cattle business insurance premiums

| Dependent Variable: Participate (Yes =1. Otherwise = 0) | | | | |
|---|-------------|----------------|-----------------|------------|
| Parameters | Coefficient | Standard error | Marginal effect | Odds Ratio |
| Age | -3.400** | 1.296 | -.768** | .0333 |
| Family member | -.187 | .877 | -.0423 | .829 |
| Education | -.952 | .676 | -.215 | .385 |
| Income | -1.708** | .529 | -.215** | .181 |
| Farming experience | 1.189** | .409 | .268** | 3.284 |
| Number of cattle | 1 | (offset) | | |
| WTP Value | .619 | .720 | .139 | 1.857 |
| Constant | 27.420* | | | |
| Log likelihood | -40.738 | | | |
| Wald chi2(6) | 16.80 | | | |
| Prob > chi2 | 0.0101* | | | |
| Hosmer-Lemeshow chi2(8) | 4,51 | | | |
| Marginal effect | | | .344 | |
| No. of observations | 74 | | | |

** The correlation is significant at the 0.01 level.
 * The correlation is significant at the 0.05 level.

Farmers' readiness to pay livestock insurance premiums was significantly and negatively impacted by the family income variable as well. Similarly, the research by Chand et al (2016) disclosed that the income of farmers had a considerable and negative influence on how willing they were to pay for livestock insurance. Furthermore, it is asserted that this may be explained by the fact that farmers with greater incomes and larger herds are often less susceptible, have superior risk-absorbing abilities, and are thus less inclined to insure their livestock. However, it is important to consider that not all farmers with higher incomes and larger herds may be less inclined to insure their livestock, as they may also have higher investment in their livestock and greater financial stakes at risk.

Farmers' farming experience or level of farming expertise was one of the criteria that significantly influenced their readiness to pay a premium for cattle insurance. This study's findings revealed a strong positive correlation between the likelihood of farmers paying an insurance premium and the length of their farming experience. A one-year increase in agricultural experience will enhance the likelihood of signing up for the livestock insurance program by one unit. This study's findings are in line with (Aina et al., 2018; Khan et al., 2013; Kurniaty et al., 2021). However, the study's outcomes diverge from those of Chand et al (2016) who found that when farmers use technology more for alternative risk management measures, there is a negative correlation between their readiness to pay an insurance premium and their experience in agriculture.

There was a negative correlation and little impact of the family size and education factors on the likelihood that farmers would be willing to pay an insurance premium. Therefore, it may be concluded that farmers will be less likely to pay insurance premiums as the family size and length of education grow. Contrary to the results of this study, farmers with greater educational opportunities ought to be more inclined to purchase insurance for their cattle businesses. This disparity may be attributable to a lack of socialization, as many farmers remain uninformed of the livestock insurance policy. Similarly, Oduniyi et al (2020) and Khan et al (2013)' studies found that education is negatively correlated and statistically



significant. Also, Takahashi et al., (2016) study revealed that there was no compelling evidence linking higher knowledge to higher insurance uptake. On the other hand, the decision to pay an insurance premium is positively and significantly impacted by education. (Dong et al., 2020; Gulseven, 2020; Kurniaty et al., 2021; Sihem, 2019). The increase in the number of family members means additional family costs, so the allocation of livestock insurance premium costs may be diverted to family costs. In addition, although the results were not statistically significant, there was a positive correlation between the premium (WTP) value that farmers were prepared to pay and their readiness to pay insurance premiums.

The marginal effect value showed the change in probability when the independent variable increased by one unit. In addition to giving more accurate results, marginal likelihood keeps the other predictors at their sample averages while showing changes in the dependent variable in response to a particular change in an explanatory variable (Singh & Chande, 2019). Farmers' likelihood of being prepared to pay for cattle insurance dropped by 76.8% when age was taken into account as a marginal effect. Likewise, a 21.5 percent decline was observed in the marginal effect of family income. Additionally, there was a 26.8% rise in the marginal effect on the farming experience variable. All things considered, the marginal impact indicated that the willingness to pay livestock company insurance premiums had a prediction probability of 34.4 percent.

When an event's chances ratio for an independent variable is one or more times greater than zero, it means that, given the readiness to pay for cattle insurance, there is a higher chance that it will occur than not. There was a higher chance that sample respondents would be willing to pay for livestock insurance if they had multiple odds ratios for factors including farmer experience (3.284), premium value that farmers were willing to pay (1.857), and other variables. Furthermore, the numerous odds ratios for other variables suggest that the interest among farmers to pay for livestock insurance is influenced by a number of different factors.

CONCLUSION

Cattle business insurance plays a crucial role in mitigating the risks faced by farmers and enhancing their confidence in engaging in the beef cattle industry. With the results of this study, policymakers can design effective *AUTS* insurance schemes tailored to the specific needs of farmers in the study area and other similar communities, especially in Indonesia. This will not only improve farmers' resilience to such risks but also encourage more people to participate in the beef cattle industry.

The contingent valuation analysis revealed that farmers' decisions on paying for cattle business insurance premiums are generally lower than the government's offered premiums. This disparity indicates that farmers in the Village may be hesitant to invest in cattle business insurance due to financial constraints or a lack of perceived benefits. Further research is needed to identify the reasons behind this discrepancy and explore potential solutions to encourage farmers to use insurance as a risk management tool. In addition, the number of farmers participating in the livestock insurance program is lower than that of those not participating, which indicates a lack of awareness or understanding of the benefits of the program. This could be attributed to various factors, such as limited access to information, cultural beliefs, or financial constraints. To address this issue, it is crucial to educate farmers about the advantages of livestock insurance and provide support to those who may face difficulties in participating, ultimately encouraging more farmers to take part in the program and safeguard their livelihoods.

Next, some policy recommendations: if policymakers want to increase the participation rate of the *AUTS* beef cattle business insurance, it could be worthwhile to target farmers who are less than 45 years old, with low to medium levels of family income, and farmers who have experience in beef cattle farming. By targeting younger farmers, policymakers can tap into a demographic that is more likely to be open to adopting new practices and technologies, including insurance. Additionally, focusing on farmers with lower to medium levels of family income can help address any financial barriers they may face in accessing



insurance coverage. Finally, prioritizing farmers with experience in beef cattle farming ensures that the insurance program reaches those who are most familiar with the risks and challenges specific to this industry. By encouraging more farmers to purchase insurance, this strategy can assist boost the industry's overall resilience in the beef cattle sector.

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